Case Study:

Implant Supported Custom Milled Bar With Horizontally Screw Retained PFM Fixed Partial Denture

A 65-year-old male lost teeth #’s 8 and 9 many years ago due to trauma. A fixed bridge from #6-11 was placed. Over time, endodontic therapy was necessary on #’s 6, 7, 10 and 11. The #6-11 bridge eventually failed, likely due to accumulated micro-trauma from bruxism and a deep overbite related to his class II, division 2 occlusion. In the pretreatment photo (Fig. 1), note the gum line fractures of #’s 6, 7, 10 & 11, the palatal contact of the lower anterior teeth and loss of bony ridge both vertically and facially. The following treatment options were considered:

- Orthodontic treatment to intrude the mandibular anterior teeth and correct posterior cross-bite prior to restorative treatment
- A conventional removable partial denture replacing #’s 6-11
- A ten-unit fixed bridge with #’s 4, 5, 12 and 13 as abutments
- Fixed prosthesis supported by two implants in #6 and #11 positions
- Fixed prosthesis supported by four implants in #6, 7, 10 and 11 positions

The patient was not interested in orthodontic treatment, so a removable partial denture would have been impossible without restoration of the six
lower anteriors. Without orthodontics to reduce the overbite, a ten unit fixed bridge would be subject to the same bruxing forces that contributed to the failure of the previous bridge; but the risk of failure would be even greater due to the anterior cantilever. The overbite and bruxism also made a fixed bridge supported by just two implants, in the #6 and 11 positions, a risky alternative. Four implants would be necessary for an implant supported restoration. After consultation with the patient, a screw retained fixed prosthesis supported by four implants was agreed upon.

Dr. Wilke placed implants in #6, 7, 10 and 11 positions (Fig. 2). In order to accommodate the ridge form and the deep overbite, the lateral implants needed to be angled farther to the facial than anticipated. Consequently, the screw access holes of the lateral incisors would exit through the facial surface of the restoration. This was unacceptable to the patient, so after extensive consultation with the patient and the dental laboratory, an implant supported, CAD/CAM generated titanium bar meso-structure with a porcelain fused to metal superstructure were chosen to address the overbite, bruxism and screw exit issues. It was anticipated that the patient’s bruxing habit might lead to porcelain damage in the future, so horizontal set screws were planned to make the PFM superstructure easily retrievable for porcelain repairs. This restorative approach would involve more treatment time and expense, but the patient understood the benefits and was enthusiastic about the plan.

To confirm the accuracy of the master cast, a verification jig (Fig. 3) was fabricated on the master cast and seated in the mouth (Fig. 4). Using denture teeth, Renstrom fabricated a diagnostic mock-up which Dr. Keller tried in the mouth to determine the position of the teeth to be restored (Fig. 5). Using this mockup as a guide, Panthera Dental digitally designed an implant supported bar (Fig. 6) that allowed enough
space so that Renstrom could duplicate the mockup with the PFM superstructure that would fit over the bar. After approval of the design, Panthera milled the bar from titanium. Renstrom fabricated a second mockup which clipped onto the bar. Wax was used for this mockup to allow easy modification if needed. The bar was tried in the patient’s mouth to verify the fit (Fig. 7). The new wax mockup was then tried in over the bar, and after some adjustment, the esthetics, function and phonetics of the mockup were approved by the patient and clinician (Fig. 8). The next step was fabrication of the overlying PFM framework. A resin and wax pattern of the PFM superstructure was fabricated directly on the bar (Fig. 9) and then cast with great care to ensure accurate fit around the horizontal set-screws which would secure the superstructure to the bar (Fig. 10). Once the fit of the superstructure to the bar was confirmed, the second diagnostic mockup was used to guide the application of porcelain to create a functional and esthetic simulation of hard
and soft tissues with pink porcelain extending into the ridge defect above #8-9 for esthetics and proper lip support (Figs. 11-12). Particular care was taken to ensure that the patient could clean the restoration with dental floss and a WaterPik. A maxillary night appliance was fabricated to minimize the risk of porcelain fracture from parafunction. The final restoration is shown in the mouth (Fig. 13). JDT

About the Author

Jeff Benson, DDS, is a 1979 graduate of the University of Minnesota School of Dentistry. He practiced fee for service restorative dentistry for 30 years until a wrist injury forced an early retirement. Since retirement, he has worked as a Technical Consultant at Renstrom Dental Studio and teaches restorative dentistry as an adjunct faculty member at the University of Minnesota School of Dentistry. Dr. Benson is also a Spear Education study club leader and Spear Faculty Club member.

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